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Plant Disease
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Management Practices to Prevent and Control Plant Diseases

Modern farming and horticultural practices often rely heavily on the use of pesticides for plant disease and pest control. All growers, however, can produce a profitable crop with fewer pesticide applications by using proper basic cultural practices and better crop management practices to reduce the incidence of plant diseases. This fact sheet describes some basic concepts of plant disease control.

Clean seed and vegetative propagating material

Some disease-causing organisms (pathogens) are commonly seed-borne, while others are only occasionally associated with seeds. Nearly all pathogens can be carried on seeds to new areas. Always use *clean* and, if possible, *certified* seed. The seed container should indicate the quality of the seed, and your seed distributor may be able to help you obtain clean seed. This is especially important when planting a crop that is new to an area, to avoid introducing new diseases harmful to the crop along with its seeds. Also, when a disease is caused by a pathogen that does not survive in the field between crops, contaminated seed continually re-infects the area. In these cases, *prevention is preferable to cure*. If the only source of seed available is contaminated, check with your Cooperative Extension Service (CES) county agent on the possibility of seed treatments. There are various physical and chemical treatments for removing pathogens from seeds.

Make sure that the seedbed soil or container rooting medium used to start plants is clean. Even "soilless" mixes containing peat moss are often contaminated with root rot pathogens such as *Phytophthora*, *Pythium*, and *Rhizoctonia*. Clean seed is wasted if fields become infested by contaminated seedling transplants.

These principles also apply to vegetative propagation material, because there is a greater possibility of surface and systemic pathogens being present. This is especially important with viruses. Take the time to obtain clean or certified stock—it will be time well spent.

Sanitation

Plants and plant parts are some of the best reservoirs of disease organisms. Destroy or remove crop residues, culled fruits, unused seedbed plants, and prunings as soon as the crop is harvested or the cultural operation is completed. Crop residues may be destroyed by burning or composting, or buried by cultivation. Shredding crop residues hastens their decomposition.

Take care that disease organisms are not transported in plant parts and soil from one field to another by cultivation equipment, crates, sacks, pots, or tools used in planting, pruning, spraying, cultivating, and harvesting.

Crop rotation

When one crop is grown year after year on the same area of land, pathogens that attack the crop have the opportunity to increase greatly, often to the point where further plantings of the same crop become economically impractical due to losses from disease. This build-up of disease problems can be avoided or greatly reduced by the practice of *crop rotation*—growing a sequence of different crops that are resistant to the pathogens in the previous crop. Crop rotation prevents the build-up of pathogens and is important in tropical areas where there is not a cold winter to help reduce the amount of pathogens in the soil.

Select crops that are adapted to the site on which they are to be grown. Disease problems are usually bad enough under the best of conditions and are worse when poorly adapted crop plants are grown.

Your CES county agent can help you plan a rotation program suited to your local conditions.

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Plant nutrition

A properly nourished plant is able to withstand or tolerate the attack of pathogens much better than a plant that has either nutrient deficiencies or excesses. A nutrient-deficient plant will be stressed and therefore more prone to disease attack. Excessive fertilizer applications can also cause plants to be more susceptible to disease. Generally, soils in Hawaii need to be fertilized, but it is important that plants receive the required nutrients in the correct amounts at suitable intervals. Soil and plant tissue analyses can provide the information needed to start and maintain an appropriate fertilizer application program. These analyses, and recommendations for specific crops based on them, can be obtained either through a commercial laboratory or (via your county CES office) the University of Hawaii Agricultural Diagnostic Service Center.

Cultural practices

The health of a plant is greatly influenced by the way it is treated as it grows. Many pathogens enter a host through an injury. Therefore, seedlings, cuttings, and other propagative materials should be handled in ways that minimize bruising and injury. Proper spacing of plants can help to achieve maximum yield per plant and per acre and can also reduce disease incidence by allowing sunshine to penetrate the leaf canopy and sufficient air movement to reduce the time that leaves are wet.

Weed control is important in and around the field. Weeds often harbor plant pathogens and they also stress crop plants by competing with them for sunlight and nutrients.

To help prevent plant diseases from gaining a foothold, prune dead and diseased plant parts and remove diseased, dying, and dead plants. Remove these to a location well away from cropping areas and destroy them by burying, burning, or composting.

When pruning landscape trees and shrubs, use the correct tool for the job and keep it sharp so that cuts are clean without torn edges. When pruning diseased tissue from plants, dip pruning blades in isopropyl (rubbing) alcohol or a 10% solution of household bleach and water after cutting and before using the pruning tools on healthy tissue or other plants. Use of pruning paint or fungicide to protect cut surfaces is generally recommended.

Too much water can be as detrimental to plants as not enough. Excess water reduces the amount of air in the soil, prevents good root development, and increases susceptibility to root-rot diseases.

Postharvest diseases are always a potential problem. Bruised and mishandled produce is more prone to postharvest diseases. Careful handling of the harvested crop, appropriate postharvest trimming and washing treatments, and proper humidity and temperature control during storage are usually well worth the investment in terms of produce quality and maximum returns.

Chemical control

Modern agriculture could not exist without the use of disease control pesticides, such as fungicides, bactericides, fumigants, and nematicides, but *they should always be used with discretion*. For some crops, scheduled, preventative pesticide applications are necessary, but for most crops the grower should make periodic inspections of the plants and treat only when the disease is observed.

A variety of pesticides is available for plant disease control. Use only pesticides with labels allowing their use on the particular crop, and follow all label directions. Applying too little pesticide will result in lack of disease control, and applying excessive amounts may result in damage to plants and in residue problems. Always use the application rates specified on the pesticide label.

The best crop management strategy should always be to ***prevent***, ***avoid***, or ***escape*** diseases if possible and then, when necessary, use pesticides properly to protect the crop or reduce disease build-up.

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(This is a revision of a document [Instant Information no. 1, 1972] by Franklin F. Laemmlen and Ivan W. Buddenhagen, formerly of the same department.)